

What is claimed is:

1 1. An image sensor unit, for use with a highly precise moveable platform, the
2 image sensor unit comprising:

3 a substrate having a wafer-shaped profile;

4 a sensor array, disposed on the wafer-shaped substrate, the sensor array

5 including:

6 a plurality of sensor cells wherein each sensor cell includes an active
7 area to sense light of a predetermined wavelength that is incident thereon;

8 and

9 a film, disposed over the active areas of the plurality of sensor cells
10 and comprised of a material that impedes passage of light of the
11 predetermined wavelength, wherein the film includes a plurality of apertures
12 which are arranged such that an aperture of the plurality of apertures overlies
13 an active area of a corresponding sensor cell to expose a portion of the
14 active area and wherein light of the predetermined wavelength is capable of
15 being sensed by the portion of the active area that is exposed by the
16 corresponding aperture.

1 2. The image sensor unit of claim 1 further including a transparent medium,
2 having a predetermined refractive index, disposed on the sensor array.

1 3. The image sensor unit of claim 1 further including communications circuitry
2 disposed on the substrate, wherein the communications circuitry is coupled to the sensor
3 array.

1 4. The image sensor unit of claim 1 further including at least one battery,
2 disposed on the wafer-shaped substrate, to provide electrical power to the sensor array.

1 5. The image sensor unit of claim 1 further including at least one battery,
2 disposed within a cavity in the wafer-shaped substrate, to provide electrical power to the
3 sensor array.

1 6. The image sensor unit of claim 1 further including communications circuitry,
2 disposed on the substrate, to provide data to external circuitry using wireless techniques.

1 7. The image sensor unit of claim 6 wherein the communications circuitry
2 provides data using wireless techniques during collection of image data by the sensor
3 array.

1 8. The image sensor unit of claim 6 further including at least one battery
2 disposed on or within a cavity in the wafer-shaped substrate wherein the battery provides
3 electrical power to the sensor array and the communications circuitry.

1 9. The image sensor unit of claim 1 wherein the image sensor unit further
2 includes:
3 data storage circuitry, coupled to the sensor array, to receive and store the
4 data from the sensor array;

5 data compression circuitry, coupled to the data storage circuitry, to compress
6 the data;
7 communication circuitry, coupled to the data compression circuitry, to provide
8 data to external circuitry; and
9 at least one rechargeable battery, to provide electrical power to the data
10 storage circuitry, the data compression circuitry and the communication circuitry.

1 10. An image sensor unit, for use with a highly precise moveable platform, the
2 image sensor unit comprising:

3 a wafer-shaped substrate;

4 a sensor array, integrated into the substrate, the sensor array including:

5 a plurality of sensor cells wherein each sensor cell includes an active
6 area to sense light of a predetermined wavelength that is incident thereon;
7 and

8 a film, disposed over the active areas of the plurality of sensor cells
9 and comprised of a material that impedes passage of light of the
10 predetermined wavelength, wherein the film includes a plurality of apertures
11 which are arranged such that an aperture of the plurality of apertures overlies
12 an active area of a corresponding sensor cell to expose a portion of the
13 active area and wherein light of the predetermined wavelength is capable of
14 being sensed by the portion of the active area that is exposed by the
15 corresponding aperture.

1 11. The image sensor unit of claim 10 further including communications circuitry,
2 disposed on the substrate, to provide data to external circuitry using wireless techniques.

1 12. The image sensor unit of claim 10 further including at least one battery
2 disposed on or within a cavity in the wafer-shaped substrate wherein the battery provides
3 electrical power to the sensor array and the communications circuitry.

1 13. The image sensor unit of claim 10 further including a battery to provide
2 electrical power to the sensor array.

1 14. The image sensor unit of claim 10 wherein the image sensor unit further
2 includes:
3 data compression circuitry, coupled to the sensor array, to compress the data
4 received from the sensor array;
5 communication circuitry, coupled to the data compression circuitry, to provide
6 data to external circuitry; and
7 at least one rechargeable battery, to provide electrical power to the data
8 compression circuitry and the communication circuitry.

1 15. The image sensor unit of claim 10 wherein the image sensor unit further
2 includes:
3 data storage circuitry, coupled to the sensor array, to receive and store data
4 from the sensor array;

5 data compression circuitry, coupled to the data storage circuitry, to compress
6 the data;
7 communication circuitry, coupled to the data compression circuitry, to provide
8 data to external circuitry; and
9 at least one rechargeable battery, to provide electrical power to the data
10 storage circuitry, the data compression circuitry and the communication circuitry.

1 16. The image sensor unit of claim 10 wherein the sensor cells are charge
2 coupled devices, CMOS devices or photodiodes.

1 17. The image sensor unit of claim 10 further including photon-conversion
2 material, disposed over the sensor array and between the film and the plurality of sensors.

1 18. The image sensor unit of claim 17 wherein the photon-conversion material is
2 disposed within the plurality of apertures of the film.

1 19. The image sensor unit of claim 17 wherein the photon-conversion material is
2 disposed on the sensor array.

1 20. A system to collect image data which is representative of an aerial image of a
2 mask that is projected on a wafer plane, the system comprising:
3 an optical system to produce the image of the mask on the wafer plane;
4 a moveable platform;

5 an image sensor unit, disposed on the moveable platform, to collect image
6 data which is representative of the aerial image of the mask, the image sensor unit
7 includes:

8 a wafer-shaped substrate;

9 a sensor array, disposed on or in the wafer-shaped substrate, wherein
10 the sensor array is located in the wafer plane, the sensor array includes:

11 a plurality of sensor cells wherein each sensor cell includes an
12 active area to sense light of a predetermined wavelength that is
13 incident thereon; and

14 a film, disposed over the active areas of the plurality of sensor
15 cells and comprised of a material that impedes passage of light of the
16 predetermined wavelength, wherein the film includes a plurality of
17 apertures which are arranged such that an aperture of the plurality of
18 apertures overlies a corresponding active area of a corresponding
19 sensor cell to expose a portion of the active area and wherein light of
20 the predetermined wavelength is capable of being sensed by the
21 portion of the active area that is exposed by the corresponding
22 aperture.

1 21. The system of claim 20 further including communications circuitry, disposed
2 on the substrate, to provide image data to a data processing unit using wireless techniques.

1 22. The system of claim 21 wherein the communications circuitry provides the
2 data during collection of image data by the sensor array.

1 23. The system of claim 21 further including at least one battery disposed on or
2 within a cavity in the wafer-shaped substrate wherein the battery provides electrical power
3 to the sensor array and the communications circuitry.

1 24. The system of claim 20 wherein the mask is a product-type mask.

1 25. The system of claim 20 wherein the aerial image produced on the wafer plane
2 is the same or substantially the same image produced on a product wafer.

1 26. The system of claim 20 further including:
2 a data processing unit configured to receive the image data which is
3 representative of the aerial image; and
4 wherein the moveable platform moves in first and second directions to a
5 plurality of discrete locations wherein at each discrete location, the sensor cells
6 sample the light incident on the exposed portion of the active area and wherein the
7 processing unit uses the data to generate an aerial image.

1 27. The system of claim 26 wherein the distance between the plurality of discrete
2 locations in the first direction is less than or equal to the width of the apertures.

1 28. The system of claim 26 wherein the distance between the plurality of discrete
2 locations in the second direction is less than or equal to the width of the apertures.

1 29. The system of claim 26 wherein the processing unit interleaves the image
2 data to generate the aerial image.

1 30. The system of claim 26 wherein the image sensor unit collects data which is
2 representative of the aerial image in a raster-type manner.

1 31. The system of claim 26 wherein the image sensor unit collects image data
2 which is representative of the aerial image in a vector-type manner.

1 32. An image sensor unit which is capable of collecting image data which is
2 representative of an aerial image of a mask that is projected on a wafer plane by a
3 lithographic unit, the image sensor unit comprising:

4 a sensor array, disposed in the moveable platform of the lithographic unit
5 wherein the sensor array is capable of being located in the wafer plane, the sensor
6 array includes:

7 a plurality of sensor cells wherein each sensor cell includes an active
8 area to sense light of a predetermined wavelength that is incident thereon;
9 and

10 a film, disposed over the active areas of the plurality of sensor cells
11 and comprised of a material that impedes passage of light of the

12 predetermined wavelength, wherein the film includes a plurality of apertures
13 which are arranged such that an aperture of the plurality of apertures overlies
14 a corresponding active area of a corresponding sensor cell to expose a
15 portion of the active area and wherein light of the predetermined wavelength
16 is capable of being sensed by the portion of the active area that is exposed
17 by the corresponding aperture.

1 33. The image sensor unit of claim 32 wherein the mask is a product-type mask.

1 34. The image sensor unit of claim 33 wherein the aerial image produced on the
2 wafer plane is the same or substantially the same image produced on a product wafer.

1 35. The image sensor unit of claim 32 wherein the sensor cells are charge
2 coupled devices, CMOS devices or photodiodes.

1 36. The image sensor unit of claim 32 wherein the sensor array is capable of
2 moving between a plurality of discrete locations in first and second directions while
3 disposed on the moveable platform, and wherein the sensor cells sample the light incident
4 on the exposed portion of the active area at each discrete location.

1 37. The image sensor unit of claim 32 wherein the distance between the plurality
2 of discrete locations in the first direction is less than or equal to the width of the apertures

1 38. The image sensor unit of claim 32 wherein the distance between the plurality
2 of discrete locations in the second direction is less than or equal to the width of the
3 apertures

1 39. The image sensor unit of claim 32 wherein the image sensor unit collects data
2 which is representative of the aerial image in a raster-type manner.

1 40. The image sensor unit of claim 32 wherein the image sensor unit collects
2 image data which is representative of the aerial image in a vector-type manner.